COOKIA

Journal of the Wellington Shell Club, New Zealand

VOLUME 18, NOVEMBER 2006

HUNTING PAPER NAUTILUS

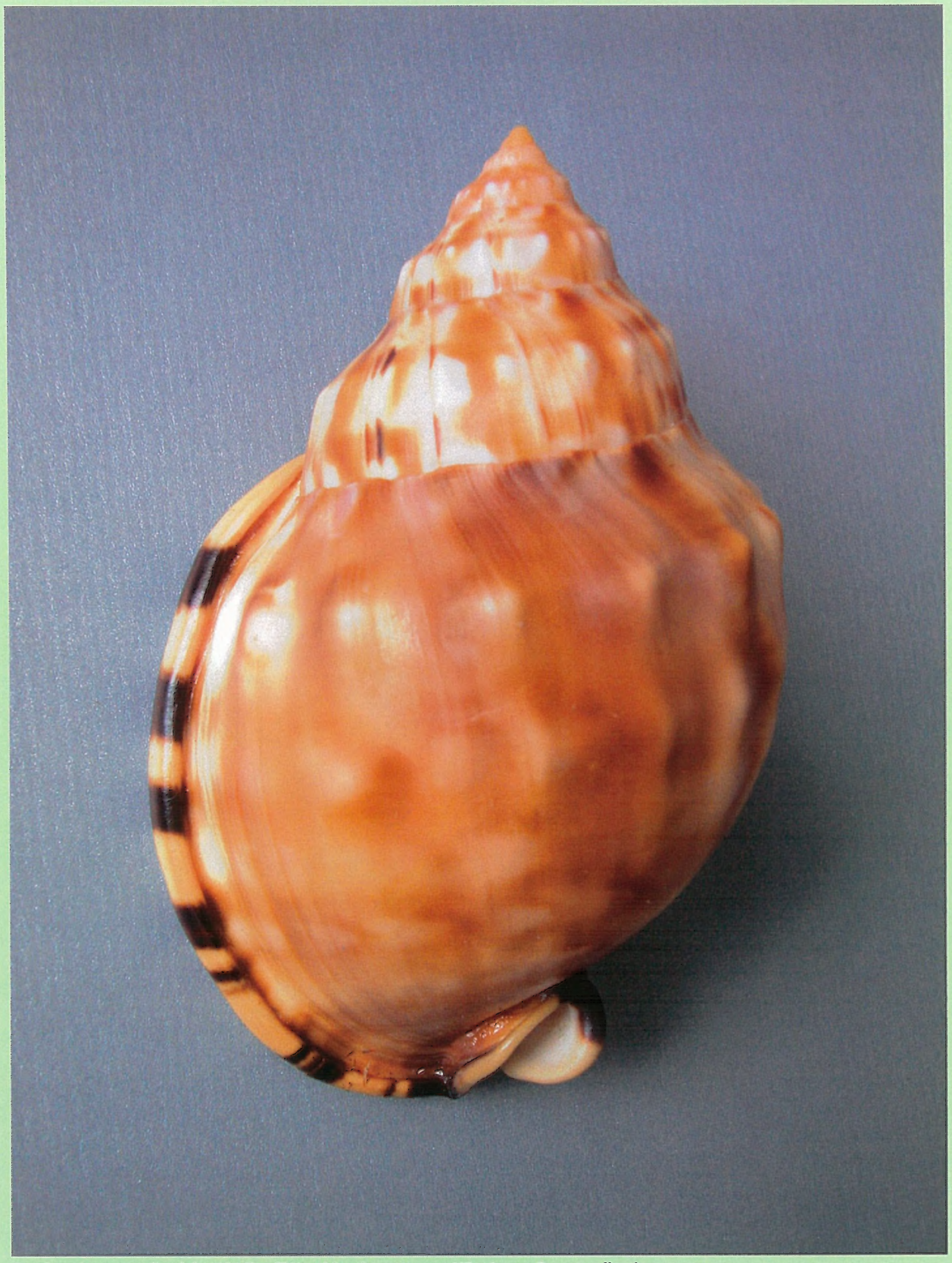
RECENT VOLUTES OF NEW ZEALAND

SHELLING THE DEEP SOUTH

GLOSSARY OF SHELL TERMS

SHELLS FOUND IN THE CATLINS

Editor's Choice



Semicassis royana (Iredale, 1914), off Northland east coast, NZ – Jenny Raven collection.

Cookia Volume 18, November 2006

© Wellington Shell Club 2006

ISSN-1171-140X

FRONT COVER PHOTO:
Cookia sulcata (Gmelin, 1791)
Collector John S. Little. It was found at Green Point, south of Titahi Bay, Wellington and was the winner of first prize "Best *Cookia sulcata*" NZ National Shell Show, Wellington, 1995.

Contents

Cookia Volume 18, 2006

	PAGE
30 YEARS OF HUNTING PAPER NAUTILUS by Bill Shortt	2-3
THE RECENT VOLUTES OF NEW ZEALAND introduced by Selwyn Bracegirdle	4-8
BRUCE MARSHALL AND THE WELLINGTON SHELL CLUB by Pat Lakeman	9
SHELLING IN THE DEEP SOUTH OF NEW ZEALAND by Ian Townsend	10-13
GLOSSARY OF TERMS USED IN ASSOCIATION WITH SHELLS compiled by Margaret Morley	14-16
ON THE TRAIL OF NOTOACMEA BADIA by Mary Agnes Wotton	16-19
COMMENT ON SHELLS FOUND IN THE CATLINS by Jenny Raven	20-22
WELLINGTON SHELL CLUB AND PUBLICATIONS	23-24

2007 NEW ZEALAND SHELL SHOW

Hosted by the
Wellington Shell Club
at the Lower Hutt Town Hall

27-28 January 2007
(Set up 26 January)

Editorial

With 2007 not far away, the club is gearing itself for hosting the New Zealand Shell Show in January.

The venue chosen is the same as the previous show in Wellington and occurs at the same time as other local events which will have a flow-on effect to attendance.

Already there is a great deal of interest from other parts of New Zealand and overseas. Dealers are booking tables and visitors are seeking accommodation.

The indicators are there for a successful event. But all club members are encouraged to participate with a display either as entry in a Show class or as a point of interest, particularly for public interest.

This issue of *Cookia* features *Argonauta argo* and *Notoacmea badia*. There is also an introduction to the publication by Bail and Limpus *The Recent Volutes of New Zealand* and we are delighted to achnowledge the work of Bruce Marshall and the way he has assisted the club over many years. The South Island is featured again, so for anyone shelling down south, *Cookia* Volumes 17 and 18 are a "must read".

As the holiday season approaches I am sure members will be out there adding to their collections and finding material to add to their Show entries – good luck and great shelling!

Selwyn Bracegirdle

EDITOR

30 Years of Hunting Paper Nautilus (and a few reflections) by Bill Shortt

Nautilus shells have fascinated me for decades. My first find ever was in the early 1970's on Mahia Beach.

One very warm February day I picked an *Argonauta nodosa* up, complete with its wide eyed owner, the female octopus, which was tucked inside with the egg cluster still intact. Not a clue in those days did I have on what I had found.

Luckily the manager of the then Napier Aquarium had a bach at Mahia and gave me the information on the find. At a later date he gave me papers on Nautilus, which ironically were Australian publications, and from memory printed in 1912. The following year I found my second *A.nodosa*, near Opoutama, when gathering tuatua. I came across one laying in the water.

A virtual drought on finds for some 10 years then on a trip down to Portland Island in January 1984 I picked up 3 large *A. nodosa* close to the landing. Yet some 20 years prior to 1984 I had been going to and fro from the Island. My late father was Mayor of Wairoa for some 12 years, and was the driving force behind removing the old Lighthouse from Portland and shifting it to the banks of the Wairoa river. I went down with him on dozens of occasions, spent hours wandering over the Island beachcombing, but never sighted a single Nautilus.

In December 1999 things really changed. The Department of Conservation were starting to liberate some very rare birds on the Island. World wide there were only around 180 of them, all living at Chatham Islands and they wanted to establish a colony on Portland Island. I was very familiar with staff of D.O.C. and explained and asked if they found a Nautilus to contact me. About a week later I was informed that they had found a damaged one. The next 3 months were a virtual "Nautilus Paradise" for me. The last week of December 1999 was perfect Mahia weather, light Nor East winds, no swell and very warm sea conditions. On the 31st December I had to go into Wairoa for the morning but driving in from Mahia I had a premonition that there would be Nautilus on Portland. Low tide that day was approx 12.30pm so how could I be in two places at once. The answer was I had a good contact who owned a Cessna aircraft. I phoned him, along with a brother-in-law, and said we were going flying!!! There is an airstrip on Portland but dodging pieces of rusty No 8 wire and dead sheep skeletons was a work of art, we actually circled four times to sort a landing path out, a relief when we taxied to a halt safely.

The day on Portland I will never forget. Gathered 36 gem *Argonauta nodosa* shells, along with a similar amount of paua, (which the Island is famed for). Luck was with me, from January 2000 to February 2001, I made a further 11 trips, mainly by boat, the Island is a 35 minutes run down from Mahia Beach.

As well, the late Andy Shaw, who was the pilot that crashed into Mt Victoria in a Russion helicopter some years ago and died a tragic death, took us down to Portland, and this was just an 8 minute flight. These early trips yielded a further 150 shells approximately.

THE ARGO NAUTILUS

This particular Nautilus had been unheard of in the district for decades.

In early April 2000 a farming contact of mine whom managed a property that ran onto Tahaenui Beach, about 25kms from Mahia, came into work with the side of a shell. I immediately realised that is was not a Nodosa but the rarer *Argonauta argo*. At the same time he told me that he had been on the beach for nearly 40 years with his family and had never seen anything like it. Two days later he contacted me again and said that he had picked up 3 more shells on the beach. Then the *A. argo* hunts started in earnest. I also had another very good contact, Alan Black, (the same 3rd generation farmer that Black's Beach is named after). I had the beaches from Mahia right through to Whakaki, some 25 kilometres, well covered. I would just grab a 4 wheel motorbike from each farm to cover each beach as there was the Nuhaka river and Tahaenui stream to contend with. When sea conditions were right find of 4 to 12 shells a day were not uncommon. I have actually now found more of the rarer *A. argo* than the *A. nodosa*. Of the 400 plus shells that I have found in 6 years, rule of thumb is about 20% are gems. I have 80 displayed in cabinets and a large glass light that we have in our lounge contains a further 20 odd that looks magnificent at night with the pristine white shells shining against the glass face. Where did the rest of the shells go??? I hope I have a lot more friends now than I had 6 years ago.

What I have learnt about *Argonauta argo* and *Argonauta nodosa*!

The *A. nodosa* are more prevalent around offshore Islands such as Great Barrier, Mayor, Portland, Kapiti, Marlborough Sounds and even Stewart Island (there are two in the Stewart Island museum). They do not appear on open beaches in large numbers. In northern Hawkes Bay they appear as early as October and are gone late February. As they move further south their occurrences tend to be in later months.

It is interesting to note they also appear on South Australian beaches and Tasmania in July and August and 3 months later on our beaches. Is there perhaps a possibility that they drift on the south eastern Australian current across the Tasman?

After birth the female octopus starts spinning the shell from about 12 days old. Little if anything is known about their breeding habits. The male of the same species does not have a shell and is only about ten percent the size of the female. Kingfish and Tuna gorge on them, I have caught large Kingfish with whole but damaged shells in the gut cavity.

When damaged at sea they are able to repair their shell, patches on the shell are not uncommon and not dissimilar to a patch on a tube. *A. nodosa* tend to wash in at night, normally on the high tide.

Offshore trawlers, particularly scampi, haul up large quantities at times, nearly all damaged with the weight of fish.

Argonauta argo

This species appear on open beaches and are seen less on offshore Islands. The season in northern Hawkes Bay is early March to early May, dependant entirely on sea conditions. Any swell will damage them. Appearances are more erratic than *A.nodosa* and they tend to wash in during daylight hours on any tide. I believe our area is one of the few in New Zealand where both species are washed inshore in close proximity.

The easiest way to distinguish between the two shells is by the width of the nodules. *A. argo* is 6-10mm and *A. nodosa* 8-15mm wide.

A. argo is more elongate in lateral view, *A. nodosa* has aperture twice as wide as the *A.argo*.

THE OTHER SHELLS

I also have a passion for Volutes. Here again I have been very fortunate to have had great contacts trawling on the high seas including Auckland Islands and the Chatham Rise. My late brother's two sons were also on deep sea trawlers.

In six years I have been able to acquire most known New Zealand volutes, including *Alcithoe pseudolutea*, *Alcithoe fissurata* at 205mm, *Alcithoe jaculoides* at 180mm and *Alcithoe arabica* at 205mm. I was given half a sack of jumbo *Alcithoe arabica* that were trawled in Porangahau Bay in relatively shallow water and a number of these were over the 200mm mark.

Probably the most amazing thing I have in my collection is a ribbon of Gold Coral that came up in a test trawl out of the Kermedec Trench from 2000 metres down.

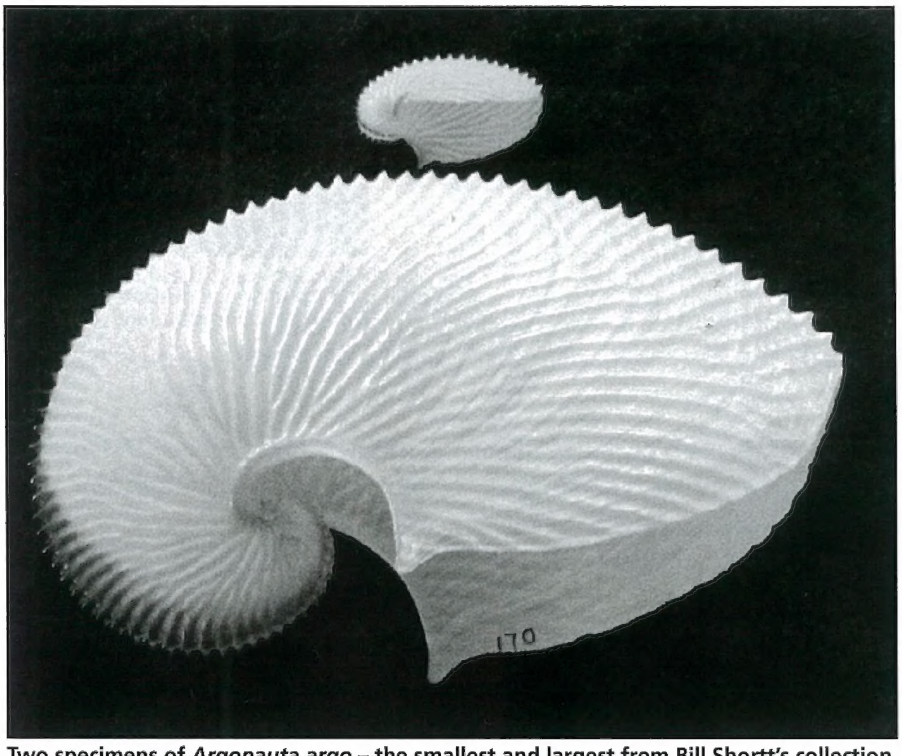
With gold at over $600 an ounce I don't handle it!!!

REFLECTIONS

My introduction to the Wellington Shell Club was through a visit by Jenny Raven to Mahia Beach. Her enquiring mind at the local Tavern six years ago, made her ask "is there anyone interested in shells here?" Bingo. A personal call at home the next day while I was away fishing and my good wife Cath decides that being a member would be a great interest for me!!!!!!

I enjoy seeing members of the Club at Mahia, particularly those who enjoy a nice red wine.

A little advice on Nautilus before I sign off. *Argonauta nodosa* appear in reasonable numbers every decade. Keep your eyes peeled in 2009.



Two specimens of *Argonauta argo* – the smallest and largest from Bill Shortt's collection. The top one is 40mm and the bottom 225mm in length.

FACT FILE

Argonauta argo

- Can grow up to 300mm
- Prefer warm seas
- Occurance is seasonal
- The shell is very fragile
- The male has no shell
- Female's shell protects eggs

Introducing a New Book by Selwyn Bracegirdle

The Recent Volutes of New Zealand
with a revision of the Genus Alcithoe H. & A. Adams, 1853
Patrice Bail and Allan Limpus

My interest in New Zealand Volutidae was aroused during our first visit to this beautiful country about 1982 when I was fortunate to visit the homes of two of New Zealand foremost collectors – Bob and Betty Grange and Hunter and Molley Seelye. I was fascinated by the diversity of the family of which we saw very limited species in Australia. It was not until I attended the Auckland Shell Show about twelve years ago that I became fully acquainted with the complexity of the Alcithoe group.

Allan and Patrice doing the tourist thing in Rotorua.

During this visit I was invited to visit the National Museum, Te Papa, and N.I.W.A. in Wellington and it was during these visits that I realised there were anomalies in the identification of much of the material which had come to light in recent times. It was during the late 1980's/early 1990's that new fisheries were being developed in areas not previously worked and so lots of exciting shells were coming on the market which were incorrectly identified. My research showed that the last time anything was written on the Volutes of New Zealand was in Powell's massive work *New Zealand Mollusca* in 1979, and this only had five pages on the family.....And so my enthusiam and curiosity was stirred.....

My co-author, Dr. Patrice Bail and I had worked together for many years on Volute studies and had published many papers and two books {on Australian Volutes}, and so we began our mammoth task. I was fortunate to have a large collection of New Zealand Volutes, and had been able to acquire the most comprehensive collections of the late Dave Gibbs and Hunter Seelye. This gave us a huge reference reserve on which to work and together with several more visits to the major museums of New Zealand and major private collections I was able to obtain photos of type material which we could use for comparative studies.

After about six years of collaboration we are proud to have been able to produce this collection of descriptions and an abundance of colour photos of *The Recent Volutes of New Zealand*, in which we have redefined several species and sub-species, and described nine new species and sub-species.

We are sure this work will become the text book on *The Recent Volutes of New Zealand.*

Patrice Bail and Allan Limpus

Allan, Patrice, Richard Willan and Doug Snook outside Doug's home in Auckland.

The Foreword to this monograph, written by Richard C. Willan, sums up beautifully the significance of this work. Richard comments on how Patrice Bail and Allan Limpus have "...altered our mindset of low biodiversity for the living volutes of New Zealand ..... the diversity here revealed is impressive to say the least ..."

This book brings together a wealth of information as well as an extensive photographic reference as never before provided in one publication on New Zealand Volutidae.

The Systematic Account for each species is related, where possible, with information such as Synonymy; Additional literature and figures; Type specimen; Other material; Type locality; Range; Habitat; Description; Animal; Discussion; Remarks; Etymology.

Photographs often include the holotype dorsal and lateral views, detail of protoconch and/or other features.

Each species' account includes a map indicating typical localities.

The Launch

On Thursday 9 February 2006 was the Wellington launch of Patrice and Allans' new book *The Recent Volutes of New Zealand* held at Te Papa.

Those in attendance were fascinated by Allan's explanation about how this book came to be. He also related his long-time interest in volutes and particularly those from New Zealand.

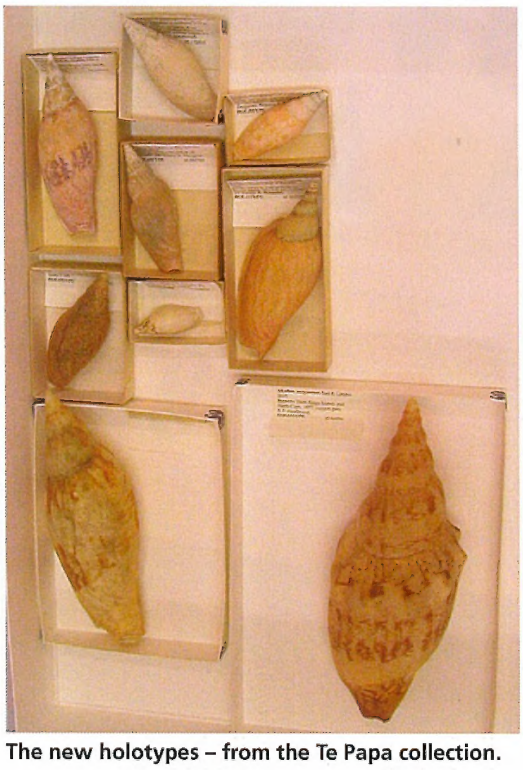
Allan presented three specially bound versions of the book (see right). Other copies of the book were available to view and the book certainly made a tremendous impression on members of the Wellington Shell Club.

The newly named species were represented by the holotypes on display from the Te Papa collection (see below).

Jenny Raven and Pat Lakeman also had displays of NZ volutes which added to the interest of the evening.

Allan noted that there has been very little exploration off the southwest of the South Island. And so our knowledge and understanding of this family from the New Zealand region will continue to grow.

The launch was an enjoyable occasion and the book a great hit - thank you Allan!

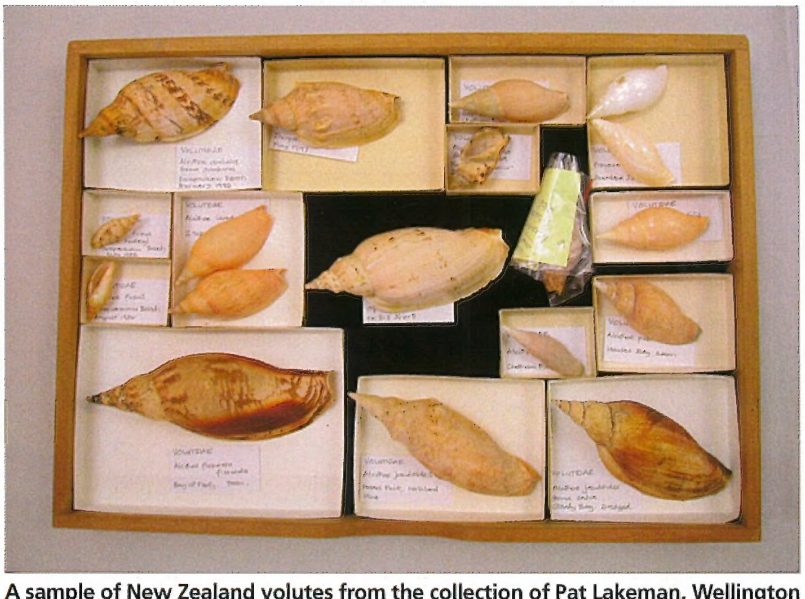


The new holotypes – from the Te Papa collection.

The Wellington Shell Club meeting, held at Te Papa, where the launch took place.

Left to right: Allan Limpus introducing the book; Allan presenting a specially bound copy to Bruce Marshall, Museum of New Zealand Te Papa Tongarewa; Allan Beu, Institute of GNS; and Andrew Hosie, NIWA.

A sample of New Zealand volutes from the collection of Jenny Raven, Wellington Shell Club.



A sample of New Zealand volutes from the collection of Pat Lakeman, Wellington Shell Club.

But all this is prefaced by an excellent introduction and background.

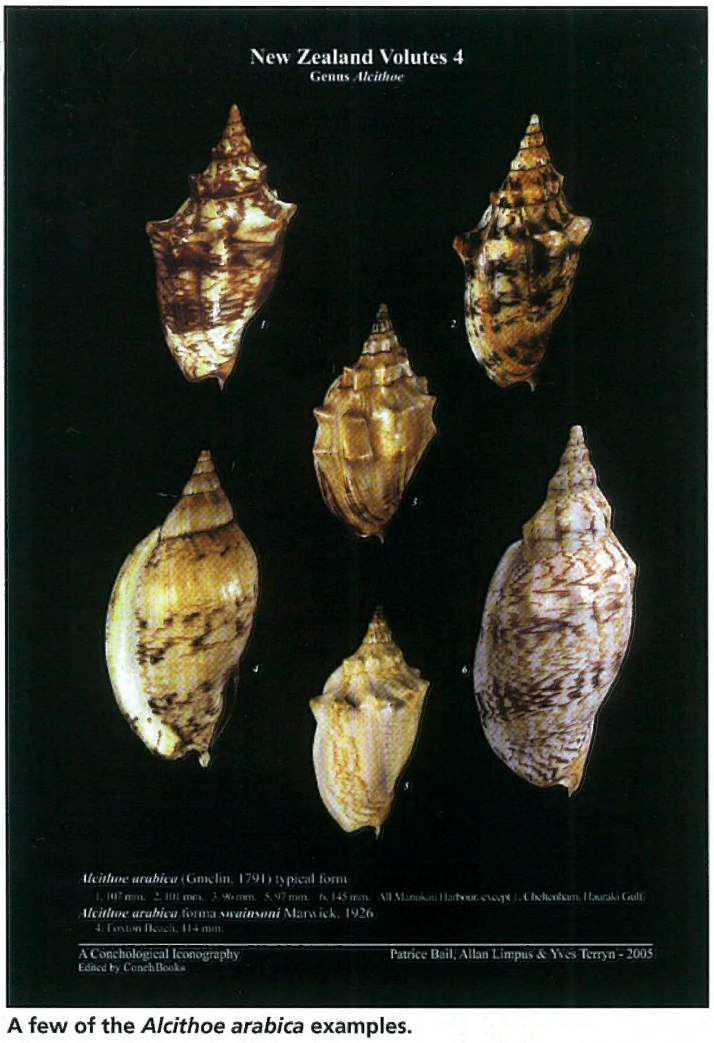
While the text part of the book covers some 73 pages, predominantly the Systematic Accounts, the colour photographic pages total 62 single sided sheets. 11 of these pages cover *Alcithoe arabica* and show how this species can vary considerably. The photographic representation of the different species will be a very helpful aid in identification and the photographs compliment the text, in the Systematic Accounts, very well.

The final two pages (see the next two pages) of the book identify the species, sub-species and forms with one identifying photograph of each, providing a quick reference for identification

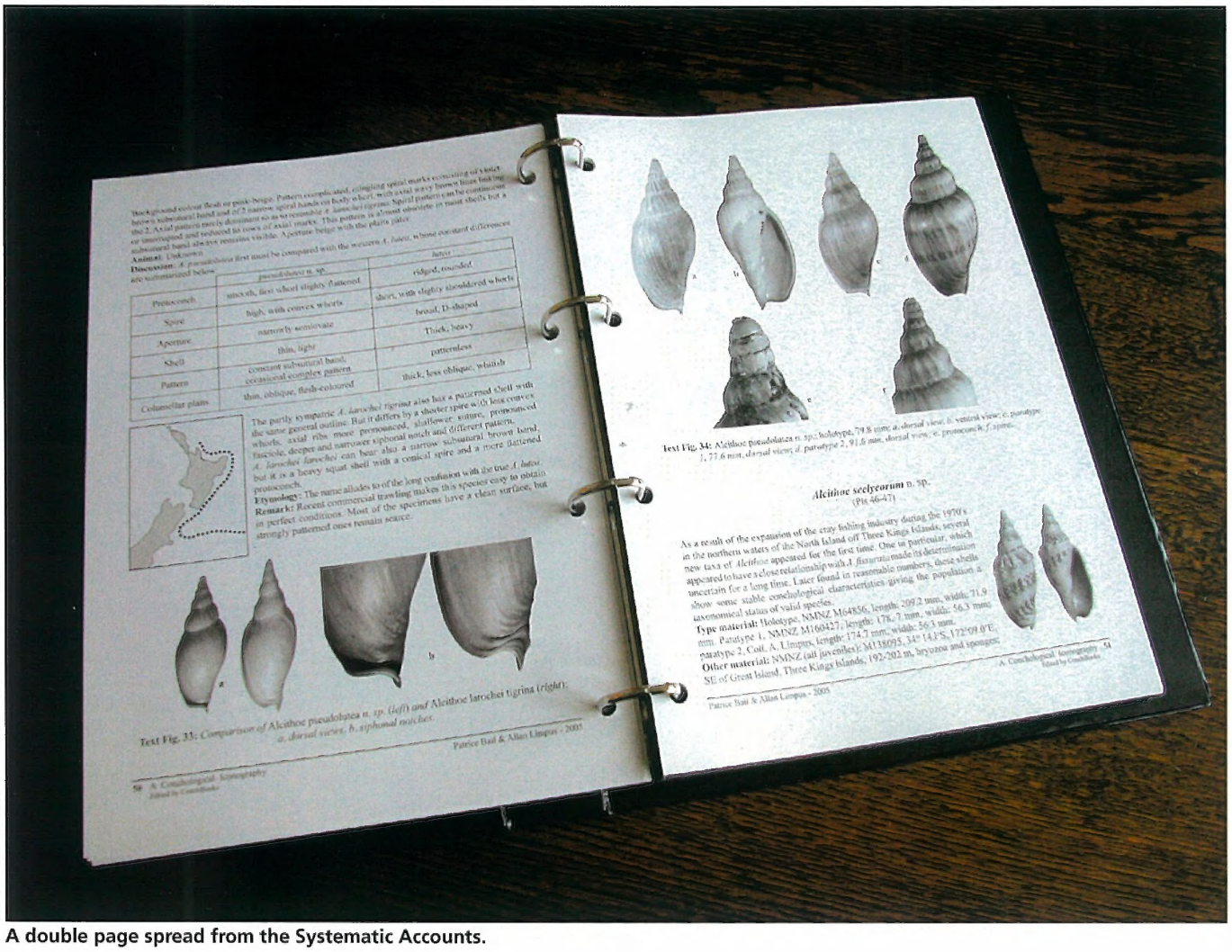
I have already put this publication to much use in confirming identification of specimens in my own collection. What a thrill it was to discover specimens of *Alcithoe seelyeorum*, one of the newly described species.

With a copy of this publication in the club library, all members have access to an invaluable resource – thank you Patrice and Allan for your efforts in bringing this work to fruition and the immense help it will be to the New Zealand volute student and collector.

Photographs from *The Recent Volutes of New Zealand* used with permission.


New Zealand Volutes 4
Genus Alcithoe
Alcithoe arabica (Gmelin, 1791) typical form
Alcithoe arabica forma swainsoni Marwick, 1926
A Conchological Iconography
Edited by ConchBooks
Patrice Bail, Allan Limpus & Yves Terryn - 2005

A few of the *Alcithoe arabica* examples.


Text Fig. 33: Comparison of Alcithoe pseudolutea n. sp. (left) and Alcithoe larochei tigrina (right).
Text Fig. 34: Alcithoe pseudolutea n. sp.
Alcithoe seelyeorum n. sp.
(Pls 46-47)
Patrice Bail & Allan Limpus - 2005

A double page spread from the Systematic Accounts.

New Zealand Volutes 61

Determination tool

aillaudorum

albescens

colesae

flemingi

arabica typical form

arabica f. *swainsoni*

arabica f. *depressa*

arabica f. *motutaraensis*

fissurata fissurata

fissurata crassa

fissurata elegans

davegibbsi

fusus typical form

fusus f. *hedleyi*

fusus f. *hedleyi* var. *haurakiensis*

benthicola

A Conchological Iconography
Edited by ConchBooks

Patrice Bail, Allan Limpus & Yves Terryn - 2005

New Zealand Volutes 62

Determination tool

jaculoides typical form

jaculoides f. *johnstoni*

jaculoides f. *calva*

knoxi

pseudolutea

larochei larochei

larochei ostenfeldi

larochei tigrina

lutea

seelyeorum

wilsonae w. typical form

wilsonae w. f. *smithi*

wilsonae w. f. *grahami*

wilsonae w. f. *chathamensis*

wilsonae acuminata

triregensis

mirabilis typical form

mirabilis forma *aurantium*

zodion

insignata

Bruce Marshall and the Wellington Shell Club by Pat Lakeman

Wellington Shell Club is fortunate to have a close connection with Museum of New Zealand Te Papa Tongarewa, thanks to Bruce Marshall who is resident Malacologist and Collection Manager of Mollusca.

From the Club's inception in May 1955, meetings were held regularly at the Dominion Museum (as it then was). Nowadays some meetings are held at membersí homes on weekends, which helps our more distant club members to attend. But we still meet regularly at Te Papa, at 169 Tory Street, where the Mollusca Collection is held. A special feature of some of these meetings is when Bruce enables us to view the collection – the largest and most comprehensive in the country: about 335,000 sample lots and several million specimens. Its scope is worldwide, with its greatest strength in specimens from the New Zealand region, including the Kermadec Islands, the subantarctic islands and the Antarctic, and also from Norfolk Island.

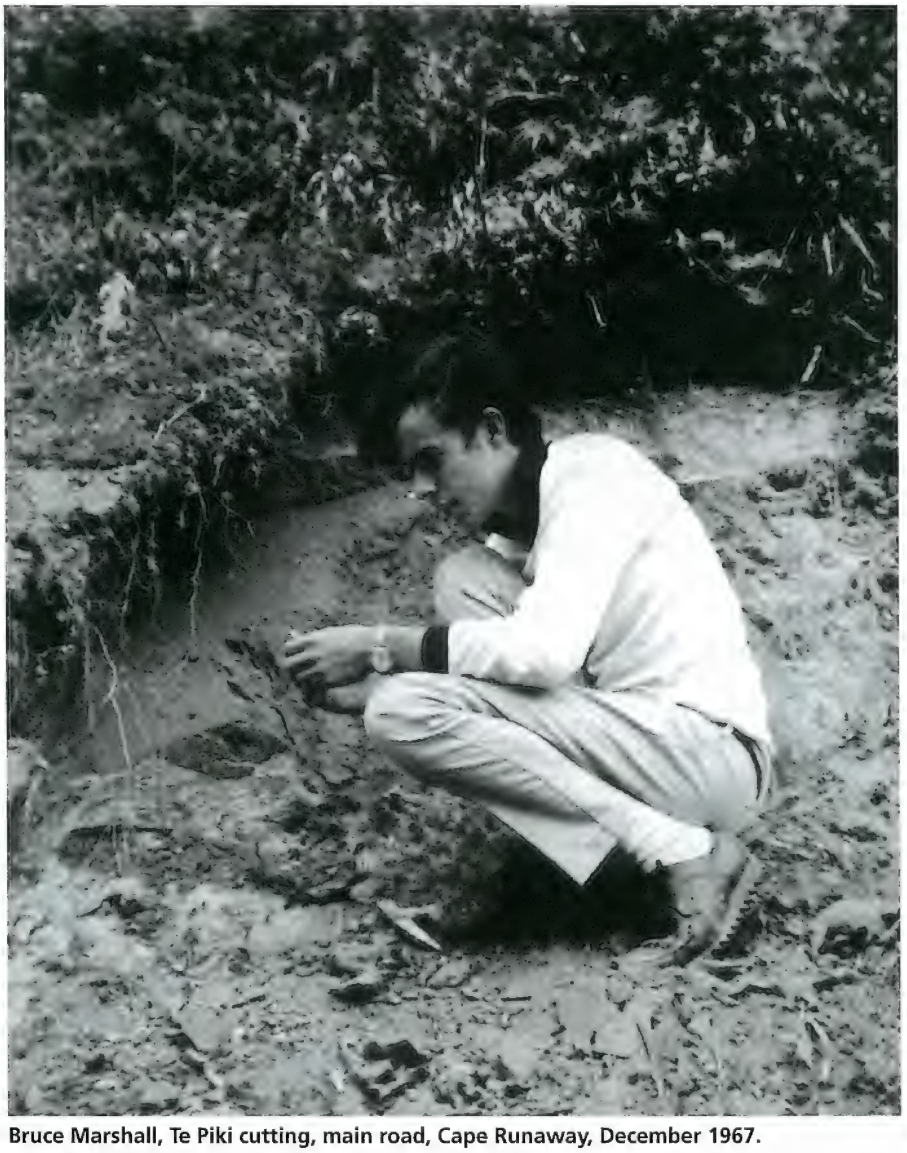
Not only is it impossible to tire of seeing such a great collection, it is the best opportunity to identify NZ shells against a large range of specimens. When in doubt, however, we are fortunate to have our resident Malacologist to ask! Bruce has been a great assistance to the Club over the years and we greatly appreciate it. For example, one of our members says:

"When I approached Bruce in 2005 for advice on researching Mitra carbonaria, he willingly introduced me to the material (literature and specimens) available at the Museum. I was able to view the specimens in the collection and was able to provide a specimen, from Green Point near Wellington, for the collection. He showed me how to use the reference literature to find the information I needed – this really is a fantastic resource. His subsequent advice on my 2005 Cookia article was invaluable".

What is a fascinating hobby for most Club members is daily work at Te Papa for Bruce – but his interest in shells goes back to his schooldays. Careful scrutiny at Te Papa will reveal a shell labelled "First shell in B A Marshall collection": a fine *Cantharidus opalus* from Kohi Point, Whakatane, collected in 1959. By arrangement with Bruce, Club members are also welcome to visit and use Te Papa's extensive library on Mollusca. Building on extensive voluntary work done by late club members W.J. (Bill) Paul and Peter Jamieson, one of our current members does volunteer work from time to time on the foreign Haliotidae, under Bruce's guidance.

VISIT THE TE PAPA WEBSITE

www.tepapa.govt.nz



Bruce Marshall, Te Piki cutting, main road, Cape Runaway, December 1967.

Shelling in the Deep South of New Zealand

by Ian Townsend (with some additions by fellow travellers)

Saturday, 28.1.2006

Leita Chrystall and Ian Townsend left Palmerston North by plane and met up with Jenny Raven, Carolyn Krebs and Pat Lakeman at Wellington. The group of five flew on to Christchurch and Invercargill, where they got a rental car and headed out to Riverton. Inspection of the motel at Taramea Bay was made and the all-important lunch consumed before driving on west to Colac Bay – not many shells but some lovely granite pebbles on the beach.

We went north-west to Gemstone Beach at Orepuki and again stones took our fancy, this time hard green quartzites. Monkey Island at the south-east end of Te Waewae Bay was more promising for shells. A good selection of southern limpets, *Cellana strigilis redimiculum* in amongst the *C. radians*. We then went round to Cosy Nook on the south side of Pahia Hill and Pat got some nice *Buccinulum vitattum*. Ian found some *Notoacmea helmsi* under boulders. Whakapatu Beach at the west end of Kawakaputa Bay had some nice *Haliotis australis* and clean washed-up limpets. Jenny picked up some egg capsules of elephant fish. Bordering the sand dunes was a patch of sand convolvulus with a fine display of pink and white striped flowers looking very elegant. The low tide at 8.30pm and lots of southern daylight kept us out late, but eventually we gave in to a meal and our beds seemed most attractive after a very full day.

Sunday, 29.1.2006

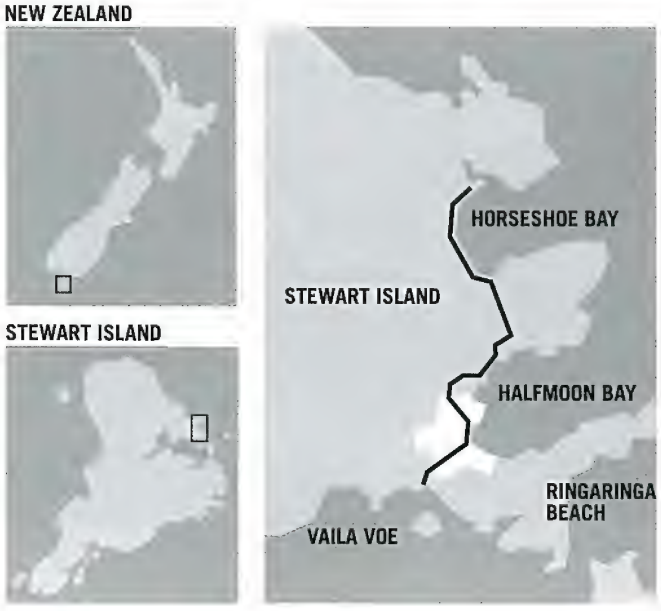
First thing we went out on the beach at Taramea Bay to look for shells and were fascinated by an ever-swirling black cloud close to the water – millions of mutton birds and oyster-catchers, presumably chasing shoals of small fish. Jenny and Pat found *Paratrophon patens* among the mussels on the low tide rocks and the rest enjoyed the beach walk in the lovely sun.

At Howells Point and the beach beyond it there were many *Haliotis virginea* virginea and Ian was lucky enough to find a large *Modelia granosa* washed up dead, but complete with animal and operculum. We ferreted around the wharves at Riverton and spied a cray-pot with three circular-saw shells in it. After a bit of juggling on rather rickety decking, Ian managed to retrieve them, only to be told they would go into a draw at the end of the trip. [However his luck stayed with him, getting a ticket for the first pick – justice was done!]

We called at Oreti Beach, but this was a motor-bike haven with no shells but squashed ones so we did not stay long. In the late afternoon we called on a recently-joined member, Lloyd Esler at Otatara. He has an interesting home crammed with books and objects of natural history. He does his own taxidermy, so there was a plentiful supply of bird skeletons hanging from the ceiling and possums and ferrets peering out from the bookshelves. A huge model of a sandfly with every fine detail depicted sat above the doorway ready to pounce on visitors!

Lloyd showed us drawer after drawer of shells, many purchased from a Stewart Island collection. He teaches classes in marine biology and has written an illustrated guide to shells of Southland (Southland Shells). He is at present writing the history of Invercargill! What a busy man, but he still had time to give us a very warm welcome.

It was hard to tear ourselves away – he was so generous with his information, but eventually we had to because there was wine to be located in Invercargill (tricky, late on a Sunday evening!) and then we had to drive to our new accommodation – a backpackers at Slope Point.



The travellers enjoying the hospitality of Lloyd Esler (seated) at his home in Otatara.

Monday, 30.1.2006

Up and away at 8.15am, back to Waipapa Point to catch the low tide. Interesting rocky foreshore with big deep pools of kelp. Large fur-seals on the beach caused some diversion as we watched them and their pups have mock battles. Ian took photos of some unusual chitons and collected some specimens of the southern fragile limpet, *Atalacmea multilinea*. Jenny and Pat found some pauas of suitable size for our evening meal, and Leita found some virgin pauas washed up on the sandy beach to the east. There was shell sand along the tide line here and a small wash up at the Point contained some large *Buccinulum pertinax* with animals still intact.

Below the lighthouse (that was badly in need of a new coat of paint) there was a sward of a tiny feathery-leaved *Leptinella*, and amongst it, flowering gentians. [Gentians are usually found in the mountains but come down to sea-level in the far south – says something about the weather!] We went out to Slope Point to see the southern-most part of the South Island and then back to the backpackers to enjoy our paua for tea.

Tuesday, 31.1.2006

Out to Curio Bay this morning. Storm clouds all around but we got pictures and a look at the beach before rain began. We sat out the showers in the car while Jenny scooped up some shell sand from the rocks.

We then moved on to Porpoise Bay. Good limpets including *Siphonaria propria* and *Cellana ornata* were on the rocks, but the wind was so rough we were being blown off our feet. We got some respite by retiring to a convenient coffee shop above the beach. Jenny ran back down to the rocks in front of the café as she had a sudden thought that the sand and rocks looked suitable for finding *Notoacmea badia*. She returned with some small Notoacmea that looked right but needed expert confirmation.

Refreshed we drove on to look at the museum at Waikawa. They had a great display of all sorts of things of historical interest from the district, including a good series of Maori artefacts. Back to Invercargill for supplies and to drop the rental car off. The owner drove us out to Bluff to get the ferry to Stewart Island and took us on a sight-seeing jaunt to the end of Highway One. The sea looked pretty wild and we were quite relieved to hear the ferry had been cancelled for the day. So an extra night on the Mainland at the Eagle Hotel.

Wednesday, 1.2.2006

The weather was much quieter this morning, thank goodness. The proprietress of the hotel was most obliging and ferried all our baggage to the ferry wharf. We caught the 9.30am fast ferry to Stewart Island which takes only an hour. The sea was still a bit lumpy just out of Bluff where the tide out of the harbour met the open sea, but it steadied down as we approached the island.

Doug Hicks was on the wharf to meet us and see us into our accommodation at Kereru Cottage. Then we all went for a walk to Lonneckers Beach. Jenny got some nice little *Thoristella chathamensis*, *Lenitrophon convexus* and *Paxula transitans* from under the granite boulders around an islet which was accessible at low tide. Ian got *Cantharidus opalus* and some limpets.

We all went back to Kereru Cottage for lunch. Leita and Ian went to the aquarium which had some interesting sea-shore animals including a huge *Scutus*, bigger than a large paua, other colourful sea slugs, fish, crayfish, octopus etc. and thousands of young seahorses. We all went on the glass bottomed boat to view some reefs in the harbour and saw lots of beautiful seaweed but not many fish.

Then we walked up Petersons Road and down through the bush to Deep Cove. The tide was well in so not suitable for collecting but we carried on to Ringaringa Beach for a look. Doug showed us a short-cut across the golf course and back up the track to Lonneckers Beach with its strong Australian scent of the gum trees. Back to the motel to prepare a late evening meal and be entertained by wood pigeons cavorting in the sky and squabbling over a well-used perch in a dead tree. Kakas were also giving us the 'once-over' and in fact would have come inside had we not closed the glass doors on them!

Thursday, 2.2.2006

Carolyn, Jenny, Pat and Doug went by Ken's water-taxi over to The Neck where they were dropped off and walked over to the open sea side to Cow Island. The trip was not without incidents: Ken finishing up with a rather bent propeller from grounding on the sand, which was not the most efficient egg-beater to deal with the choppy sea on the return trip!

However it had its rewards – Jenny had the amazingly good luck to find a kelp hold-fast that was not holding too fast and also was crammed full of good specimens of *Margarella antipoda rosea*! The end of the bay yields plenty of large *Haliotis iris* for eating, and many washed up *Haliotis australis*. *Buccinulum vittatum* are plentiful and Jenny finds a good large *Buccinulum pertinax*, also *Monodilepas monilifera* along the high tide drift line. Carolyn found *Cominella nassoides*. However Pat had the largest find of the trip and came staggering back with a pilot whale skull.

Pat with a pilot whale skull.

The team at Lonneckers Beach.

Meanwhile, Leita and Ian went walk-about on beaches from Bathing Beach round to Mill Stream and Braggs Bay. They were asked not to collect on Horseshoe Bay because that was on the programme for tomorrow, so satisfied themselves with a look at "Moturau Moana" native garden and found quite a few native orchids in seed. Then they doubled back to Ringaringa Beach and took photos of the "Sand Forest" (As the tide recedes water runnels take the black augite sand over the brown sand to create scenes of weird tree-trunks and delicate branches.) Around the island Ian looked under kelp holdfasts but found only sea lice, a colony of wheel shells inhabited by hermit crabs and a huge sea centipede coiled around them all. Leita got a good *Buccinulum pertinax* and *Gari convexa*. They called at Evening Cove and Leask Bay on their way back to Kereru Cottage and got there in time to see Pat heave her whale skull on to the deck (at that stage thought to be a porpoise). During our evening meal we were entertained by kakas taking tit-bits from the deck in front of the dining room. They just LOVE cheese!

Friday, 3.2.2006

The morning turned to rain but Ian and Leita headed off early to look at plants and let the others catch up by 10.45 to "do" Horseshoe Bay. They noted (in a small bay at the south end of Horseshoe Bay a large *Alcithoe arabica* consuming an almost equally large *Ruditapes largilliertii*. Horseshoe Bay lived up to its reputation and by the appointed hour we were all happily zigzagging our way along the beach (in the rain) finding good pairs of *Gari convexa*, *Struthiolaria papulosa* and blue mussels. There was plenty of *Zeacolpus symmetricus* along the water-line where the tide was still lapping. At the old jetty at northern end Jenny and Pat waded out in the water and saw live *Alcithoe arabica*, some with very nice patterns. By then our stomachs were making noises for lunch so we sheltered from the rain at the paua processing factory and imbibed. Around the rocks by the breakwater we found a nice virgin paua, large limpets (*Cellana strigilis redimiculum* and *C. ornata*) and *Buccinulum pertinax*. We were so engrossed we hardly noticed the rain had stopped and by the time we came to return along the beach the sun was shining. Back at Kereru House we had an entré of crayfish, thanks to our host, Roger Hicks. The resident kakas showed great interest in our shell-cleaning operations and we wondered if we might lose a specimen or two. ["I knew I had another one of those somewhere!"]

Saturday, 4.2.2006

This morning we transferred to Kaka Motel, 100 yards up the road. And yes, there were even more kakas! We got Ken and his water-taxi to drop us up at Maori Beach. He seemed a bit unsure about landing us with an outgoing tide, but after some rather cryptic instructions about us holding on to a rope (he wanted us to act as a sea-anchor) we were told to "bugger off, then"! We had to wait for the waves and push hard to get him off the sand. He would not have been pleased if he was stuck there until the next tide, especially as he had some American tourists on board who wanted to be taken somewhere quite different. Shelling was good – *Calliostoma granti*, *Gari convexa*, *Modelia*, *Divalucina cumingi*, *Tanea zelandica*, *Scalpomactra scalpellum*, *Diplodonta* and *Hunkydora* to name a few. In the afternoon Leita and Ian left ahead of the others so they could enjoy the bush track and the many orchids and other plants that were there. It was interesting to note that there did not seem to be as many birds in the bush as around the settlement. We completed our decadence with a taxi ride from Lee Bay back to Halfmoon Bay. Of course it, and the boat trip was all in aid of us having more time for shell collecting!

Paterson Inlet.

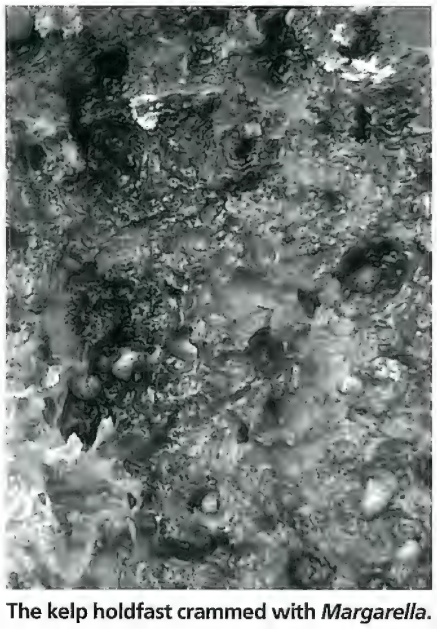
Sunday, 5.2.2006

We got the water-taxi to drop us at a jetty south of The Neck and we walked over a track to Ocean Beach. Ken was back to his jovial self today. Perhaps that was because we were using a jetty with no worry about grounding his boat on the sand. We all had a good time picking tiny keyhole limpets (*Monodilepas monilifera*) from along the strand lines. Rocks at the south end were good for silvery paua, *Buccinulum pertinax*, *Modelia* and *Cantharidus opalus*. Also large paua (*Haliotis iris*) – so guess what we had for our evening meal! On the inner harbour side (Little Glory Bay) there were good *Cellana ornata*, *C. strigilis redimiculum* and *Notoacmea pileopsis sternus*. Jenny went to the jetty with her fishing line a few minutes early and couldn't stop blue cod jumping on to her hooks. She had three by the time Ken arrived, right on time for our 4.30 pick-up. Another good day shelling.

Monday, 6.2.2006

Pat, Carolyn, Leita and Ian took the water taxi to Ulva Island in Paterson Inlet – a superb day without a breath of wind made our visit magical. We wandered the bush tracks, saw rare birds and were badgered by wekas whenever we wanted to get anything out of our packs (especially lunch!) "Please don't feed the birds" just fight them off. We were very impressed by the richness of the bush – we saw about nine species of native orchid alone. We were picked up at 1pm and dropped back at Golden Bay. From there we walked on round to Vaila Voe on the west side of Paterson Inlet – a great place for collecting shells that climb out of the sand at low tide. These include *Xymene ambiguus*, *Lepsithais lacunosus*, *Lenitrophon convexus*, *Cominella nassoides* and *Buccinulum vittatum*, *B. pertinax* and *B. pallidum*. Of course the widespread *Cominella nassoides* was also present. On the way back Ian and Leita are joined by Pat and detour through the Raroa and Fuschia Walks – there to spot and photograph a beautiful native orchid – a large *Gastrodia*, still in flower. A wind-up meal at the hotel completed our day.

On the beach at Cow Island.



The kelp holdfast crammed with *Margarella*.

Ian and Leita enjoying the Stewart Island bush.

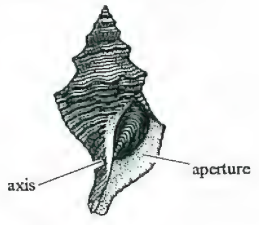
Tuesday, 7.2.2006

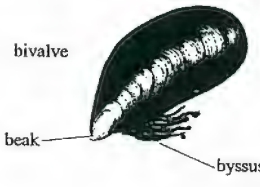
Up early to pack and catch the 8am ferry to Bluff. Doug was on the wharf to see us off, having been away for the last few days tramping to Mason Bay. A very smooth ride on the catamaran, and we were back in civilisation. Eleanor from the Eagle hotel collected our baggage and stored it for us while we went off to see the sights of Bluff! One we couldn't miss – we visited Mr Flutey at "The Paua House" and saw his grandfather's extensive shell collection. Unfortunately many of them were varnished to make them look better. The pauas outside the house have been taken in because the weather was starting to degrade them, but there's hundreds on the walls inside, and some unusual colours too. Also lots of other "things". Then it was out to the airport for us and, after a delay, planes back up north and home.

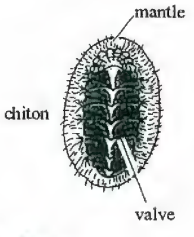
Glossary of terms used in association with shells

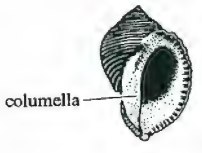
prepared by Margaret Morley

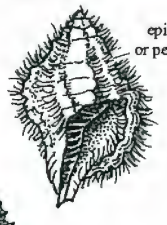
accessory valve: small, third external valve or plate as in *Pholas* and *Barnea*.
adductor muscle: muscles which close a bivalve shell.
algae: non-flowering plants. Seaweeds.
anterior: the front end. In bivalves the umbones usually turn towards the anterior end and the pallial sinus is posterior. In gastropods the lower canal is anterior being the head of the animal and the spire is posterior. In limpets the apex is usually near the anterior end, at the head of the animal. Opposite of posterior.
aperture: opening of a gastropod.
apex: tip or earliest formed part of the shell.
apophysis: a projecting peg-like structure. e.g. in rock borers.
arcuate: curved or arched.
ascidian: sea squirt.
axial: longitudinal ribs or colour banding in a gastropod.
axis: central structure of a gastropod.
barnacle: crustacean, larvae-free swimming, adults permanently attached by the head to rocks, logs, ships.
beak or umbone: oldest part of bivalve, the small tip near the hinge.
benthic: bottom dwelling.
bifid: divided by a groove into two parts, used to describe hinge teeth in bivalves.
bivalve: one of the classes of molluscs, two shelly valves hinged by a ligament.
binomial: two names-genus and species used in scientific nomenclature.
body whorl: the last whorl in gastropods.
brachiopod: lamp shell. Has two valves and an internal skeleton, in a different phylum from molluscs.
bryozoan: moss animals, minute colonies with a distinctive pattern, living on rocks, shells, seaweeds.
buccal: pertaining to the mouth parts of an animal.
byssus: anchor threads spun by some bivalves, e.g. green-lipped mussel, *Perna*.
calcareous: hard, composed of calcium carbonate.
callus: hard, calcareous, shiny deposit around some gastropod apertures.
canal: semi-tubular for the siphon at the anterior end of the gastropod aperture.
cancellate: a lattice of axial and spiral cords intersecting at right angles.
cardinal teeth: hinge teeth beneath the beaks in bivalves.
cephalopoda: one of the seven classes of molluscs, e.g. octopus, squid, cuttlefish, argonaut and nautilus.
cerata: dorsal appendages in nudibranchs.
chiton: coat of mail shell, having eight valves surrounded by a leathery girdle. Class Polyplacophora.
chitinous: horny, flexible material.
chondropore: spoon shaped depression on the hinge of some bivalves e.g. *Mactra*.
cilia: hair-like processes.
clathrate: latticed with bisecting striae or cords.
coelenterate: a phyllum. Sac-like bodies with a single internal cavity, e.g. jellyfish, anemones, corals.
columella: pillar or central axis of a gastropod.
commensal: two species living together, sharing food, not parasitic.
conchology: study of marine, fresh water and land shells.
corals: marine animals related to sea anemones.
cord: a spiral ridge.
cordate: heart shaped.
coronate: encircled by a row of spines or prominent nodules e.g. on the shoulder of a gastropod.
costate: strongly ribbed.
crenulated: with regular notches or crenulations.
cusp: point of a radula (tooth of a gastropod mollusc).
dentate: with distinct teeth.
dextral: shell coiled to the right – most gastropods.
discoidal: whorls coiled in one plane, with flattened spire.
divaricate: diverging sculptural elements.
dorsal: near bivalve hinge. In gastropods the area opposite the aperture.
ears: extensions at each side of the beak in bivalves, e.g. scallop, fan shells.
echinoderm: in a phylum of marine animals, e.g. kina, starfish, snapper biscuits, sea cucumbers, brittle stars.
edentulous: lacking teeth.
embryonic whorls: protoconch, whorls of larval shell at the apex of a gastropod.
endemic: native to a certain region, not introduced.
epidermis: or periostracum, the external skin of a shell.
epiphragm: the mucus seal over the aperture of a land snail produced in the dry season.
extant: living species.
escutcheon: depressed shield shaped area behind the beaks in a bivalve.
fasciole: successive edges of a canal in some gastropods, indicating growth stages, e.g. *Muricopsis*
fimbriate: fringed.
fissure: slit or cut.
foot: the muscular organ of locomotion. In bivalves it digs the shell into the sand.
foramen: natural opening or orifice, e.g. keyhole limpets, paua.
fossil: hardened remains or traces of plant or animal from a previous geological period.
foraminifera: or forams. Protozoans – single celled animals which secrete a shell.
funicle: ridge of callus spiralling into the umbilicus, seen in naticid gastropods.
fusiform: spindle shaped, with spire and aperture of nearly equal length.
gastropod or univalve: usually a single coiled shell. Gastropod means stomach foot.
gemmate: shell sculpture with bud-like swellings where axials and spirals meet.
genus: group of closely related species.
girdle: in chitons, fleshy surround to the shelly valves.

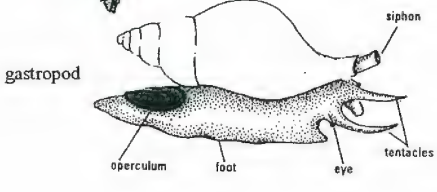




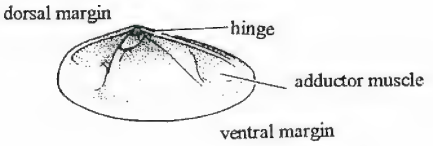


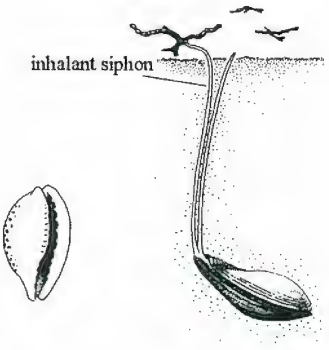


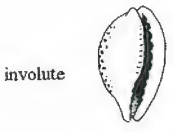


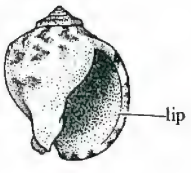


glaucus: green to grey colour. e.g. as in *Chiton glaucus*.
globose: rounded like a globe. e.g. as in *Diplodonta globosa*.
granular: shell sculpture with small pustules.
growth lines: lines or ridges showing rest periods in shell growth.
height: in gastropods measurement from the apex to the tip of the anterior canal; in bivalves from the beaks on a vertical line to the edge of the ventral margin.
heterostrophic: protoconch coiled opposite to adult whorls.
hinge: interlocking tooth devices joining the two valves of a bivalve.
holotype: a single specimen used as a type to describe a new species.
homonym: a name given incorrectly because it has already been used for a different species.
imbricated: plates or laminae overlapping each other like tiles.
imperforate: without an umbilicus.
infaunal: living in bottom sediments.
inflated: swollen or distended.
inhalant syphon: a tube-like organ for the intake of water.
inner lip: portion of the aperture adjacent to the columella or pillar.
incised: sculptured with sharply cut grooves.
insertae sedis: uncertain classification.
interstices or interspaces: spaces between the hinge teeth, ribs or cords.
involute: last whorl enveloping earlier ones, rolled in from each side as in *Cypraea*.
keel: an oustanding rib, usually marking an abrupt change of slope in the shell outline.
labrum: outer lip in gastropods.
lamella: thin plate or sharply raised ridge.
lateral teeth: bivalve hinge teeth set furthest away from the beaks.
left valve: hold bivalve with the beaks uppermost, the pallial sinus towards you. The left valve is on your left.
lenticular: lens shaped.
ligament: a horny band above the hinge in a bivalve, usually placed externally.
linear: very narrow, like a line.
lip: margin of the aperture of a gastropod.
lirate: fine raised, thread-like sculpture.
lithodesma: calcerous reinforcement of an internal ligament in a bivalve.
littoral: referring to the intertidal zone on a shore.
lumen: opening, cavity of a tubular organ. See scaphopod.
lunule: heart-shaped depression in front of beaks in a bivalve.
luteous: yellow to orange in colour.
maculated: spotted.
malacology: science or study of mollusc animals and the shells.
malleated: surface with a hammered appearance.
mammilated: bluntly rounded.
mantle: membranous covering of a mollusc which secretes the shell and encloses the gill space.
medial: in the middle.
mollusc: invertebrates with a soft body, the majority have an internal or external shell.
Monoplacophora: primitive class of mollusc, two known New Zealand species.
mucronate: ending abruptly in a sharp point or spine, e.g. *Amalda mucronata*.
nacre: pearly or irridescent substance which lines the interior of some shells.
nematocyst: explosive, stinging cell of an anemone or other coelenterate.
neotype: selected specimen to replace the original type if lost, destroyed or damaged.
nodose: having knobs or tubercles.
notum: upper surface of a sea slug.
nucleus: earliest formed part of a shell. See protoconch.
nudibranch: sea slug. Nudibranch means bare gills.
operculum: horny or shelly lid which partly or wholly seals the aperture when animal retracts into shell.
outer lip: outer lip of the aperture.
oviparous: producing eggs that hatch sometime after leaving the body.
ovoviviparous: producing eggs that hatch within the body or immediately afterwards.
paleontology: study of fossils or extinct organisms.
pallets: pair of shelly compound structures at siphonal end of *Teredo* or shipworm.
pallial line: an impression in the interior surface of a bivalve produced by the edge of the mantle.
pallial sinus: notch in the pallial line.
paratype: a specimen(s) collected at the same time as the holotype and used in the description of the species.
parietal: upper part of the inside wall of aperture in a gastropod.
pedicle: short stalk anchoring animal to a solid object, e.g. goose barnacles.
pelagic: animals swimming or drifting in the open ocean, e.g. *Janthina*.
penultimate whorl: last whorl before body whorl.
periostracum: hairy or smooth skin-like covering on the exterior of many shells.
peristome: complete rim or lip around the edge of the aperture.
phylum: chief or primary division of the animal or plant kingdom, e.g. Phylum Mollusca.
pillar or axis: central structure of gastropod.
plait: fold on the columella or pillar.
planispiral: flattened spiral, e.g. *Planorbis*.
plankton: animals and plants living at or near the surface of the sea, most are microscopic.
plicate: folded or pleated.
polychaetes: many segmented and bristled marine worms.
polymorphic: a species having many different forms.
posterior: apical end of gastropods, siphonal end of bivalves, opposite of anterior.
posterior canal: notch or tubular extension of the posterior margin of the aperture.
post nuclear whorls or teleconch: whorls subsequent to the protoconch in gastropods.
proboscis: snout-like extension of the head between the tentacles.
produced: elongated.
propodium: foremost division of the gastropod foot used to push aside sediment during locomotion.
protoconch: embryonic shell of a gastropod, frequently different in design, texture or colour from the adult shell. Also used recently for the rudimentary shell at the tip of the beak of a bivalve.

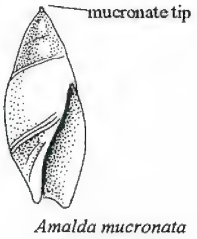




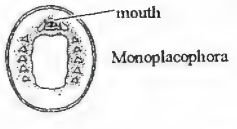


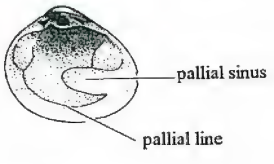


Cominella maculosa



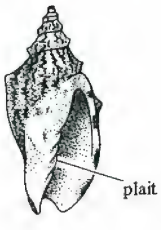
Amalda mucronata

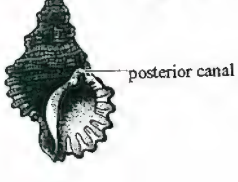




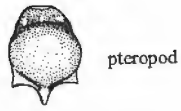
Janthina exigua

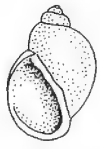
pelagic

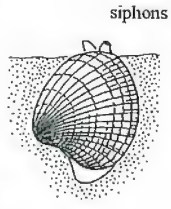


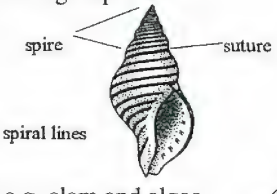


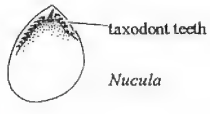
pteropod: pelagic molluscs with wing-like expansions of the foot, e.g. sea butterflies.
pyriform: pear shaped
quadrate: four sides, square or rectangular.
radiating: ribs or lines that start at the beaks of a bivalve and spread out like rays to the margin.
radula: tooth bearing, ribbon-like tongue used for rasping food in most molluscs apart from bivalves.
resilium: cartilage associated with bivalve hinge, causing shell to open when the abductor muscles telax.
rhinophore: pair of club-like sensory appendages of a nudibranch.
rib: rounded prominent ridge.
right valve: see left valve.
Scaphopoda: one of seven classes of moolusc, like a hollow tube or tusk, open at both ends.
sculpture: ornamentation
selenizone: spiral band of growth lines associated with marginal slit or foramen in certain gastropods.
septum: partition.
serrate: notched like a saw.
sessile: permanently attached by the base, e.g. barnacle, *Serpulorbis*.
sinistral: coiled in a left-hand spiral, opposite of dextral.
sinus: bend, cleft or pouch-like hollow, e.g. in growth lines on a shell, in the attachment scar of the mantle.
siphons: tubular extensions of mantle for passage of inhalant and exhalant water currents.
spat: spawn of shellfish.
species: a population of interbreeding individuals which are reproductively isolated from other groups.
spicule: small, sharp pointed body in the framework of a sponge, used to identify species.
spire: all the whorls of a gastropod except the body whorl.
spiral lines: lines which run parallel with the direction of the growth.
striate: shell sculpture with the appearance of microscopic scratches and grooves.
sub-littoral: below low tide mark.
sulcus: groove or furrow.
suture: continuous spiral line that marks the junction of the whorls of a gastropod.
symbiosis: association of unlike organisms, each depending on the other for its existence, e.g. clam and algae.
synonym(s): two or more names for the same species.
taxodont: a bivalve hinge with numerous interlocking teeth, e.g. *Nucula*, Arcidae.
taxonomy: theory and practice of classifying organisms.
teleconch: entire gastropod shell except the protoconch.
tessellated: checker board pattern.
topotype: specimen from the same locality as the type specimen.
tremata: holes, e.g. those in *Haliotis*
truncated: squarely cut off.
tumid: swollen.
turbinate: top shaped.
type: a specimen upon which a species is based.
umbilicus: circular depression or cavity at the base of some gastropods.
umbones: the oldest part of a bivalve, also called the beak.
univalve: gastropod.
valve: one part of a bivalve, one of the eight plates of chiton.
varix: ridge on a gastropod indicating the position of the lip at the end of a previous growth period.
veliger: molluscan larva at the free-swimming stage.
velum: ciliated mantle flap by which a molluscan larva swims.
ventral: under side, in bivalves the edge remote from the hinge.
verrucose: warty.
viscera: soft internal organs, e.g. digestive.
whorl: single complete turn of a gastropod.

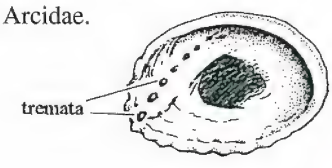


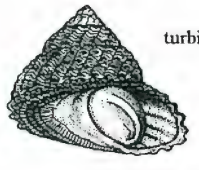


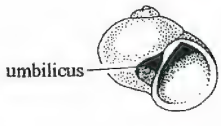


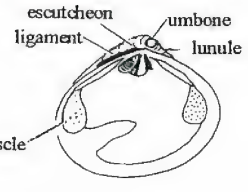


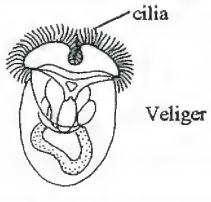












REFERENCES
Oliver, P. G. 1981. [illegible]. Compiled by J. Cole and [illegible] members, Dunedin Sea Life Group. Auckland Institute and Museum Inc. 1985.
Powell, A. W. B. 1951. [illegible]. Compiled by Winifred B. Arnold. The Veliger Supplement to Vol. 1. 1958.
Powell, A. W. B. 1979. [illegible]. Auckland Museum.
Compiled by Margaret Morley, with improvements and input by Penny Smith. August 1996. Updated 2000.

On the Trail of *Notoacmea badia*

by Mary Agnes Wotton

I first collected *Notoacmea badia* Oliver in 1981 from its type locality at St. Clair Beach, Dunedin. It has always been a mystery to me that it was not recorded from anywhere else except St. Clair. *Notoacmea* are usually abundant rocky shore dwellers and are widespread throughout New Zealand. Then in 1984 I found it at Kaka Point, where Peter Jamieson had also collected it way back in 1979 but unidentified until my article [Cookia 4(3)], and at Nugget Point, both in the North Catlins. Since then it has been my ambition to try and find its southernmost location. The opportunity arose when Jenny Raven and myself organised a 10-day collecting trip through the Catlins in Southland which included tracking *N. badia*.

Tide tables checked and dates fixed, we set off for Dunedin in mid-October 2005, picked up our hire car for the drive to Slope Point, arriving at our farm stay backpackers after dark to very comfortable accommodation which we had to ourselves. This working farm was run by a young couple with a baby. Our first objective was Waipapa Point where the low tide the next morning was at 8.46am so it was a really early start. A hot drink and a banana and we were away by 7.00am for the 30 minute drive to the Lighthouse, planning to return about mid-morning for breakfast. Six hours later we were still prowling about this fantastic location!!

The tide was very low, 0.4, so the rock platforms below the lighthouse were completely uncovered to where they met

the bull-kelp and pounding surf. There were fascinating rock pools to look in, both shallow and knee-deep, and Jenny found a couple of paua which we later had as steaks for dinner, unadorned Jenny-style – I am a fan for life!

The interesting thing about these rock platforms was that it appeared the zonation was horizontal rather than vertical e.g. *Patelloida corticata* which are abundant in the encrusting pink coralline algae zone were on horizontal surfaces unlike at Island Bay where they occur on vertical surfaces. *Cellana strigilis redimiculum* was the dominant limpet along with *Cellana radians*. Some very smooth rocks yielded *Cellana stellifera* which are usually found low down in the intertidal zone but they were not abundant. As we progressed inshore to shallower pools, *Atalacmea multilinea* were found on the undersides of smooth stones as also were *Notoacmaea parviconoidea*. At the western end of Waipapa Point, which we finally reached when the tide was already on its way in, the rock platforms enclosed a deep lagoon and in the shallowest part *Notoacmea helmsi* were found under stones. In the abundant beach drift there were dozens of large *C. stellifera* which made us wonder whether the rocks here would have been a good source for this species. No sign of *Notoacmea badia*!!

Jenny's prize of the day was a bright mushroom-coloured *Buccinulum pertinax*. Limpets notwithstanding, mine was a beautiful but small *Margarella antipoda rosea*, found in the roots of a kelp holdfast that was still standing but already dead and minus its leaves. It was quite a job hacking away at these with our collecting knives to discover whatever was hidden in its crevices. Jenny was a mine of information on where to look for certain species.

Curio Bay with its petrified forest was our next destination and seeing it at low tide we easily spotted the tree stumps and the trunks of fallen trees. A very fascinating place. There was a wide powerful surge channel pouring between the rock platform where the petrified forest was and a rocky cliff opposite with a small sandy beach below the cliff. We were able to cross over to this area which was strewn with dead kelp and by fossicking under this, discovered an interesting variety of shells including *Margarella antipoda rosea*. Driving around Waikawa Harbour we headed to the point opposite Curio Bay where the campsite was located overlooking Porpoise Bay with its beautiful long sandy beach. From the hill above the camp we were able to look back towards Curio Bay. Porpoise Bay's beach was practically devoid of shells but the rocks at one end had very clean uneroded specimens of *C. strigilis redimiculum* and *C. radians*. Just as I went onto the beach from the camp, I spotted a large *Modelia granosa* which, unfortunately, had a hole in the protoconch.

View from headland above Porpoise Bay towards Curio Bay.

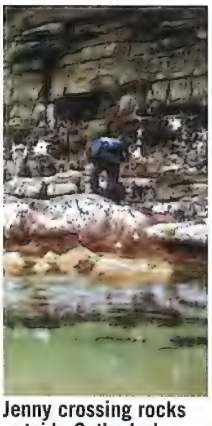
We headed up coast to Papatowai, stopping en route to visit the Cathedral Caves during the low tide as that is the only time the caves are accessible. A lovely bush walk led from the parking area down hill to the beach, again quite pristine with no shell wash-ups. A 15-minute walk brought us to the two caves, the first one blocked by a deep tidepool and the second cave accessed by scrambling over a rocky ledge as this cave also had a tidepool in front of it. From the second cave we could then walk back through to the first one. They are very stunning and worth visiting, especially for the low fee of $3, not to mention a lovely walk along the beach on a sunny day. The towering rocks here also had very nice large specimens of *C. strigilis redimiculum* and *C. radians*. Siphonariidae were found on the walls just inside the entrance to the second cave.

At Papatowai campsite we wandered down the short path from the camp to the beach but this was only a small shell-less area, hardly worth exploring so off to Picnic Point beach, only 5 minutes drive. There were a lot of wash-ups here and as the tide was in, we only had a brief look at the rock platforms but they were certainly promising. So it was back there the next morning kitted out in wet weather gear and with overtrousers for the rock pools. The rock platforms were at the furthest end of the beach and just behind where they started was an area of shell sand. Small surge channels broke up the platforms and Jenny found the first specimens of *Margarella turneri* under the stones here. We spent most of the day wandering over the platforms turning up all sorts of things including some very nice specimens of *Siphonaria propria*. I discovered a lovely small pool filled with large rocks, quite deep, where I sat for nearly an hour watching *Margarella turneri* disporting themselves among the kelp and other algae. They are beautifully coloured and so very active. Jenny was off poking round the channels. Still no sign of *Notoacmea badia* but a couple of paua steaks for dinner again that night. It was becoming quite addictive.

Pounawea near Owaka was our next port of call. We managed to get the last available cabin at the Pounawea Motor Camp as it was the start of Labour Weekend and fortunately for us they had had a cancellation. Situated on an estuary, this is a very picturesque spot with an interesting bush walk starting at the far end of the camp, also a very attractive place. This was a good base to explore the area and our first foray was across the estuary to Jack's Bay. Not much doing in the way of shells but after checking out the rocks, Jenny spotted a yellow-eyed penguin on the cliff directly above our heads, having a rest on its way home. A truly exciting and memorable experience as it was so close to us and not in the least worried by our presence. After that we were able to spot the sand tracks made by other penguins where they had come ashore for the night.

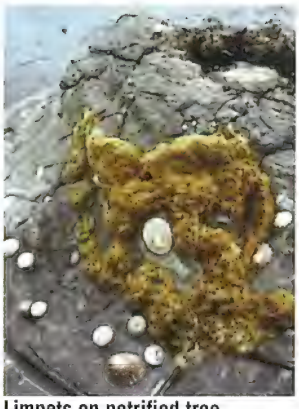
Next day we headed north to Kaka Point after the elusive *N. badia*. Of course, I had no clear memory of where I had collected the 1984 specimens except it was right beside the road as we had parked the caravan there and I was able to hop out and find them in a matter of minutes – with four children in tow I wasn't allowed much collecting time! I recalled that it had been on quite small rocks and not too far out from the shore

so we checked the rocks near the public toilets as that seemed a likely place to start – nothing. Back towards the direction of Nugget Point to check those out and still nothing. We then continued south towards Nugget Point, stopping en route at various rocky outcrops. Incidentally the rock platforms had now disappeared and there were just rock outcrops of various sizes along the beaches here. At Nugget Point we walked to the Roaring Bay hide to have a look for yellow-eyed penguins and spotted two coming ashore way down on the beach below us. My other specimens of *N. badia* had been collected here also in 1984 and we had accessed the rocks with no difficulty but now the beach was below the cliff where the hide was located and there was only a steep track down to the rocks. So nothing doing there. I had not been to the Nugget Point lighthouse the last time so we went to have a look at the spectacular view of the Nuggets, large rocky outcrops rising from the ocean floor which are home to a variety of seabirds.

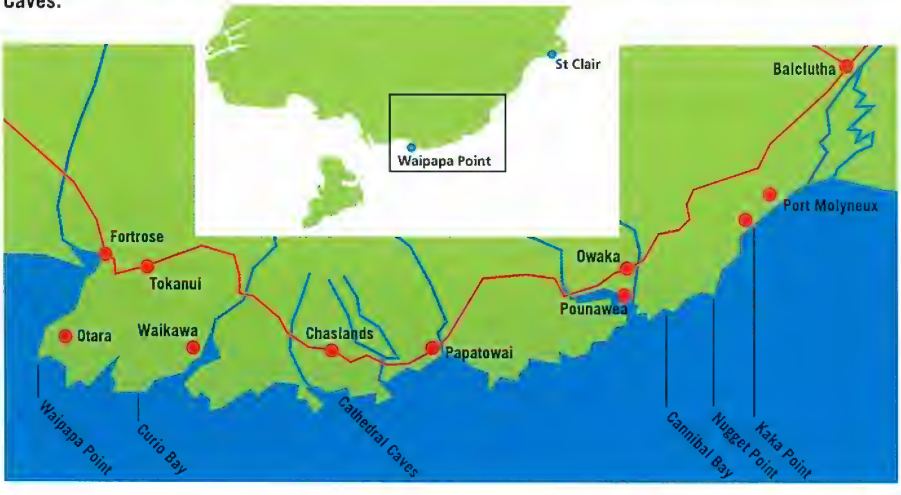


Jenny crossing rocks outside Cathedral Caves.

Waipapa Point looking west.



Limpets on petrified tree stump, Curio Bay.



On the way back, a bit frustrated at our inability to find *N. badia*, we decided to check out the last rocky beach at the northernmost end of Kaka Point. Beyond that, the sandy beach seemed to stretch north for miles. We parked on the road and went down the sandy cliff via a rough path. The tide was already starting to come in so we were pushed for time and only able to search rocks fairly near inshore. Suddenly Jenny gave a shout and I went as fast as I could through the surging sea and there they were!!! Lots of small *N. badia* in little clusters of 4 or 5 mostly in association with the red algae *Lophothamnion hirtum*. The small rock ridge on which they were, was about knee high with green sea lettuce being the other seaweed present. The mussel *Xenostrobus pulex* was also very much in evidence. We diligently searched around all the rocks close by but there was no sign of *N. badia* on any others. We finally had to give up looking as the tide was quickly covering the rocks and making searching difficult. But WE HAD FOUND THEM!!

Heading back to Owaka again, we detoured off the main road to visit Cannibal Bay and Surat Bay, named for the vessel Surat which was wrecked there in 1874. Both were good places to see Hooker sea lions sunning themselves on the sandy beaches. At Cannibal Bay we watched one frolicking in the water before it decided to come out and roll in the sand! At Surat Bay also, another one came right into the shallows beside where we were walking along the beach and just lay there looking us over. No shells on these beaches – again!

Finding *N. badia* was definitely a cause for celebration so a stop was made in Owaka en route back to Pounawea , to replenish our dwindling wine supply.

Our last day at Pounawea, we crossed the estuary again and drove to Owaka Heads for the low tide. The paua collectors were out in force as it was a Saturday. I had a try at collecting them but was pretty hopeless and it was left to Jenny to get our dinner for that night, again!! She also showed me where to look for *Buccinulum* and they were there in abundance sitting on the sand under smooth rocks, quite clean specimens. The limpets here were also good, some of the *C. radians* with a delicate golden colour.

Then it was time to head north, hopefully to a camp just south of Dunedin but this turned out to be unsuitable so we ended up in Dunedin for Labour Weekend at the excellent Dunedin Motor Camp at St. Clair. A visit to the Otago University Marine Studies Centre and Aquarium at Portobello on the Otago Peninsula was a must. I remembered from my visit there in 1984 how interesting it was and Jenny had missed out on previous visits to Dunedin as it does not open to the public until 12 noon. Although not large, it is a fascinating place with lots of hands-on activities and touch pools with several molluscs and wonderfully coloured sea anemones in a natural environment. Plus tanks with sea horses, fish and more.

St. Clair Beach was quite near the camp but the sea was pounding in with heavy surf beside the swimming pool and the rocks where *N. badia* had been found were under water and inaccessible. The area had also changed from 1981 as there were now enormous rocks in place along this end of the beach, piled on top of each other from the sand almost up to the level of the road above. These extended right out to the original rocks. Very little marine life had established itself on these newer rocks. A short walk along a path behind the swimming pool did not offer easier access as this ran

along the top of the cliff with only a steep dangerous-looking track to the beach. Our second visit we went at low tide prepared to give it a go and try to reach the original rocks in spite of the waves pounding in – there was nothing calm about this beach! It was certainly better for surfers than swimmers. Venturing across the small expanse of exposed sand then through heavy waves almost up to our knees, we reached the rocks where we thought we could climb up to the ledge beside the swimming pool. It was all I could do to stay upright! Jenny went up first, avoiding the huge gaps between the rocks and I followed with great trepidation until we were both standing on the ledge. Then Jenny discovered that the ledge was still about 1 to 2 metres above the rocks we were trying to access!! So it was with great reluctance that we decided to abort our mini-expedition and head back to safer shores.

We spent most of another day on the Port Chalmers side of Otago Harbour as far as Aramoana. The beach here had a lot of washups including *Paphies donacina*, *Tawera marionae* (many live wash-ups), *Trochus viridis* and thousands of *Mariocolpus roseus*. Over on the adjacent Spit Beach which was more sheltered, I found a very good *Scutus breviculus* and more *Tawera marionae*. Where the beach reaches the estuary there were a couple of *Alcithoe fusus*, not very good specimens, a *Callisotoma punctulatum* and two live *Xymene ambiguous*.

Heading back to Port Chalmers, we stopped at Dowling Bay where Jenny had previously collected *Haliotis virginea*. Along the shoreline there were some nice large *Notoacmea helmsi* under smooth stones but nothing else. But Jenny's rocks, further out, finally yielded one specimen of *H. virginea* on the underside of a very large boulder, which was pretty exciting. Then it was Carey's Bay for all sorts of goodies on the rocks beside the boatshed. At the Port Chalmers Boating Club, we searched under the rocks by the boat ramp for *Thoristella chathamensis* which Jenny had previously found there, finding only a few but several *Xymene traversi*.

Our last collecting day we decided to drive to Brighton, 10km south of Dunedin, as Jenny had previously done some collecting there. The beach is very attractive with some lovely rock formations and although we wandered among them for quite a while, did not find anything of great interest. It was not a very low tide so some of the rocks were inaccessible. Then as we started back I found a small shallow rock pool with lots of tiny limpets in it and bending down for a closer look, what did I spot but *Notoacmea badia* mixed in with juvenile Cellanas! It obviously has very definite preferences where it inhabits as this was the only spot where we found it. Brighton Beach certainly merits a closer look for this species.

Well, it was back to Dunedin and being Labour Day, our problem was to find a restaurant open where we could have a celebratory dinner. The ones within walking distance of the camp were all closed so we ended up with some delicious Chinese takeaways in our very comfortable tourist flat, and a bottle of wine. We did not have to drive home!!

Holotype of *Notoacmea badia*, from Saint Clair, Dunedin, W.R.B. Oliver, December 1920. Automontage images of holotype (NMNZ M. 1562) courtesy of Bruce Marshall, Museum of New Zealand Te Papa Tongarewa.

Swimming pool at Saint Clair, Dunedin.

Notoacmea badia, it seems, is not a dweller of the rock platforms which are dominant along the southeastern coast as far south as Waipapa Point and does not appear until Roaring Bay at Nugget Point when the platforms are replaced by rock outcrops. But even so, they seem to be quite choosy about which rocks they settle on. Whether the association with *Lophothamnion hirtum* is significant, it is difficult to say as we sometimes found this algae on rocks but no sign of *N. Badia*.

What remains now is to check for its northernmost location along the coastline north of Dunedin and see whether this species occurs anywhere between there and Banks Peninsula. A project for another day!!

The rock outcrop at Kaka Point where *Notoacmea badia* was found.

***Notoacmea badia* in situ with *Lophothamnion hirtum* and *Xenostrobus pulex*.**

Comment on Shells Found in the Catlins by Jenny Raven

I had never been to the far south eastern coastline of New Zealand known as "the Catlins" until I visited there with Wellington Shell Club member, Mary Agnes Wotton in October 2005. I loved the place and within three months I was back there again on another Wellington Shell Club trip.

The Catlins coast is not a particularly good area for beach collectors. It has the most wonderful, attractive long sandy beaches, but most are bare of shells with the rocky headlands in between exposed to constant wave action. There are however good pockets of shell sand and shell wash-ups to be found with interesting shell life in the rock pools. The presence of good sized *Haliotis iris* at extreme low tide in several locations is an additional tasty bonus. Waipapa Point was the best area for shells. There was interesting shell life among the rocks and reefs surrounding the lighthouse and good shell sand and shell wash-ups along the high tide line in the slightly more sheltered area to the right of the lighthouse. Curio Bay contained good shell sand among the high tide rock crevices and at the rear of a deep gut on the right hand side of the bay. Porpoise Bay is just around the headland from Curio Bay and likewise it contained good shell sand at the far right-hand end of the bay on the first visit but both localities were devoid of shell sand and wash-ups on the second visit. One area of comparative shelter and interesting shell life was at the Owaka Heads where the Punawea estuary empties into the sea. It was interesting to observe how the sea life changed as we slowly progressed from sheltered estuarine waters through areas of increasing salinity and finally turbulence as we neared the open sea.

The prime aim of the first visit was to find *Notoamea badia* and its southern most location. I had never collected it before so really had no clues on where to find it. We started in the south and from Waipapa Point to Owaka we tried hard to find it but had no luck. Eventually we found it near the end of our trip at Kaka Point where Mary Agnes had found it many years before. It was not common being on only one of hundreds of rocks we checked but on that rock it was living in abundance. On reflection it would have been better to have started at Kaka Point because after finding it again in a mid tide pool at Brighton near Dunedin further north, I began to assemble some clues as to its habitat. It is very similar in appearance to *Notoacmea parviconoidea*. Both have a brown surface but *N. parviconoidea* is darker and higher. It frequently has a couple of white flecks on the back and lives on the backs of mussels or on or under rocks. *Notoacmea badia* appears to like living on the surface only of isolated rocks on sandy beaches. It lives at a lower tide level and has a distinctive dark L-shaped mark at one end of its greyish coloured interior.

On the second trip when I again visited Porpoise Bay, we had finished our beach walk and examination of the rock pools when I was suddenly struck by the similarity of some rocks in the centre of the beach to those at Brighton. I ran back down to the rocks -there were only two or three small pools and in one I saw what looked like a *Notoacmea badia* on a stone. There were two other specimens in the same pool. At home later Mary Agnes confirmed they were indeed *Notoacmea badia* – completely overlooked on our first visit when we had collected a few limpets from the same rocks! A few days later I had a good look over rocks which were similarly sited on a sandy beach at Ringaringa on Stewart Island but no *N. badia* was present so Porpoise bay for now is its southern most location.

Looking at other shells we found it was nice to find the Margarellas – *M. antipoda rosea* and *M. turneri* so typical of the Southland and Stewart Island fauna. We found *M. rosea* living inside kelp holdfasts at Waipapa Point, also washed up at Curio Bay. The secret to finding this lovely species is to roam about the low tide channels where the sea is swirling about the kelp holdfasts and wait till you spy an old holdfast

Atalacmea multilinea

Margarella antipoda rosea

Zemitrella sulcata

SHELLS FOUND IN THE CATLINS	Waipapa Point	Curio Bay	Porpoise Bay	Cathredral Caves	Papatowai (Picnic Pt)	Owaka Heads	Kaka point	Comment	Occurrence
GASTROPODA									
Cellana radians	L	D	L	L	D	L		On intertidal rocks	C
Cellana ornata		D	L		D			On intertidal rocks	C
Cellana strigilis redimiculum	L	D	L	L	D	L		On intertidal rocks	C
Cellana stellifera	L				D			On extreme low tide rocks	U/C
Asteracmea suteri	D		D					In shell sand	U/C
Atlacmea fragilis	L							On underside of mid tide stones	C
Atalacmea multilinea	L		D					On underside of mid tide stones	U/C
Notoacmea badia			L				L	On isolated rocks in sandy areas	R
Notoacmea helmsi	L		D				D	On underside of mid tide stones	C
Notoacmea elongata	L							On underside of mid tide stones	
Notoacmea pileopsis sturnus					D	D		On shaded high tide rocks	U/C
Notoacmea parviconoidea	L	D		D	D		L	On mussels and rocks	C
Patelloida corticata	L	D	D		D	L		On low tide rocks	C
Radiacmea inconspicua	D	D	D					On backs of paua	C
Haliotis iris	L				L	L		On low tide rocks	C
Haliotis australis	L	D						On low tide rocks	U/C
Haliotis virginea	D	D	D		D			In beach drift	U/C
Emarginula striatula	D	D	D					In beach drift	C
Scutus breviculus	D								
Tugali stewartiana					D				
Cantharidella tesselata	L	D	D		D			On and under stones	C
Diloma arida		D	D						U/C
Diloma nigerrima		D	D						U/C
Diloma bicaniculata	L	D	D					On underside of mid tide stones	C
Diloma subrostata	L							On muddy sand	C
Margarella turneri					L			On/under stones in low tide pools	U/C
Margarella antipoda rosea	L	D						In kelp holdfasts	U/C
Melegraphia aethiops	D	D	D						C
Micrelenchus huttonii						L		Under stones	C
Micrelenchus tenebrosus	L	D			D			In shell sand	C
Micrelenchus sainguineus	D	D	D					In shell sand	C
Thoristella chathamensis	D		D				D	In beach drift	U/C
Trochus tiaratus			D					In beach drift	U/C
Trochus viridis	D	D	D					In beach drift	C
Antisolarium egenum	D							In shell sand	U/C
Calliostoma punctulatum	D	D						In beach drift	U/C
Modelia granosa		D						In beach drift	U/C
Turbo smaragdus	D	D							C
Eatoniella roseola			D					In shell sand	U/C
Zeacumantus subcarinatus	D							In beach drift	U/C
Zeacolpus symmetricus		D	D				D	In beach drift	U/C
Nodilittorina antipodum	D	D	D				D		C
Risellopsis varia	D	D						In shell sand	C
Rissoina chathamensis	D		D				D	In shell sand	C
Maoricrypta sodalis			D					In beach drift	U/C
Sigapatella novaezelandiae	D	D	D		D			In beach drift	C
Trichosirius inornatus	D		D					In shell sand	C
Zachlys murdochi			D					In shell sand	U/C
Paratrophon patens	L	D			D		D	In shaded rock crevices	C
Lenitrophon convexus						D		In shell sand	U/C
Haustrum haustorium	D	D						On low tide rocks	C
Xymene aucklandicus			D					In shell sand	U/C
Xymene traversi	D	D	D					In beach drift	C
Xymenella pusilla			D				D	In shell sand	U/C
Lepsiella albomarginata	L		D					In shaded rock crevices	U/C
Lepsithais lacunosus	D		D						U/C
Buccinulum pertinax	L								U/C
Buccinulum vittatum			D			D			C

(L) Live; (D) Dead; (C) Common; (U/C) Uncommon; (R) Rare

SHELLS FOUND IN THE CATLINS	Waipapa Point	Curio Bay	Porpoise Bay	Cathredral Caves	Papatowai (Picnic Pt)	Owaka Heads	Kaka point	Comment	Occurrence
Paxula paxillus							D		
Paxula transitans '	D				D	D		In shell sand	U/C
Zemitrella sulcata		D	D				D	In shell sand	U/C
Austromitra rubinosa		D						In shell sand	U/C
Neoguraleus lyallensis	D		D				D	In shell sand	C
Neoguraleus murdochi			D				D	In shell sand	C
Liracraea epentroma	D	D	D					In shell sand	C
Linopyrga rugata			D					In shell sand	U/C
Trimusculus conicus		D	D		D			In beach drift	C
Benhamina obliquata	L	D		L				In shaded rock crevices	U/C
Siphonaria propria	L	D	D		L	D	D	On low tide rocks	C
Siphonaria australis	L	D	L	L	L	L		On low tide rocks	C
Amphibola crenata			D					In beach drift	U/C
Marinula striata	D		D					In shell sand	U/C
BIVALVIA									
Nucula nitidula			D					In shell sand	C
Nucula harvigiana			D					In beach drift	C
Barbatia novaezelandiae			D		D			In beach drift	C
Mytilis galloprovincialis					D				C
Vertipronus mylitis	D		D					In shell sand	C
Aulacomya atra maoriana		D	D		D				C
Modiolus aeriolatus					D			In beach drift	C
Modiolarca impacta				D				In beach drift	C
Talochlamys zelandiae	D	D	D					In beach drift	U/C
Lasea hinemoa	L		D					In shell sand	C
Borniola reniformis			D					In shell sand	C
Cardita aoteana	D	D	D		D			In beach drift	C
Mactra murchisoni					D				
Paphies australis					D				U/C
Macomona liliana						*D*		In beach drift	C
Pseudarcopagia disculus	D							In beach drift	C
Gaimardia fosteriana			D					In shell sand	C
Austrovenus stutchburyi						D		In beach drift	
Protothacca crassicostata					D			In beach drift	C
Irus reflexus	D		D					In beach drift	C
Ruditapes largillerti			D			D		In beach drift	C
Hiatella arctica	D	D	D					In shell sand	C

(L) Live; (D) Dead; (C) Common; (U/C) Uncommon; (R) Rare

that is full of holes and only loosely connected to the rock; position yourself behind it and pull hard with both hands, watch where you fall of course! but hopefully you will still have the holdfast and be rewarded with the sight of many *Margarella* sliding about the inner surface of the holdfast. *M. turneri,* on the other hand, prefers algae in rock pools and was noted alive crawling around in mid tide pools at Picnic Point, Papatowai. At Waipapa Point among the low tide rocks I found the largest *Buccinulum pertinax* I have ever collected being 48mm high but it appeared to be on its own unlike at Stewart Island where it lives in abundance in Paterson Inlet.

In the shell sand from Waipapa Point and Porpoise Bay it was good to find a selection of shells endemic to New Zealand's southern waters. These included: *Liracrea epentroma*, *Paxula transitans*, *Zemitrella sulcata*, *Xymene aucklandicus*, *Gaimardia fostoriana* and the dark *Marinula striata.* Larger shells in this category were *Zeaculpus symmetricus* and *Atalalmea multilinea* – the latter living under stones at Waipapa Point. The commoner *A. fragilis* was present also. In better condition in the Catlins than you can usually find in other parts of New Zealand were: *Paratrophon patens*, *Lepsithais lacunosus* and *Siphonaria propria* – the *Siphonaria propria* were particularly clean, large specimens with dark purple interiors. Very common at Curio Bay was *Micrelenchus tenebrosus* and *M. sanguineus* though *M. tenebrosus* was squatter and more pinkish and *M. sanguineus* smaller and less straight sided than usual such that I originally thought both were different species.

Appended is a list of most of the shells found on these two trips. Although not complete, it should form a good basis for further collecting from this interesting area.

Wellington Shell Club 2005-2006

President: Jenny Raven

Vice Presidents: Doreen Burr, Selwyn Bracegirdle

Secretary: Deirdre Standish • Email: deirdre.standish@clear.net.nz • Telephone 938 6554

Treasurer: Jenny Walton • PO Box 40685, Upper Hutt • Telephone 528 5618

Editor: Selwyn Bracegirdle • 7 Astor Street, Karori, Wellington • Email: creatus@paradise.net.nz • Telephone: 973 9410

Newsletter: Jill Burnet • 84 Brougham Street, Mt Victoria, Wellington • Telephone: 384 7418

Librarian: Deidre Standish

Sales table and raffles: Kris Woods

Website: John Little • http://users.actrix.co.nz/littlejn

2005 Membership Fees: Single $12 • Family $15 • Overseas $20

Cookia Contributions

Members and other readers are invited to submit contributions (handwritten, typed or electronic) but, preferrably, these should be in the Editor's hand before the end of May for inclusion in that year's issue (look at a recent issue to see the style to follow).

Please use (unless there is a stated reason not to do so given in your manuscript) the molluscan names in the latest *Checklist of the Recent Mollusca described from the New Zealand Exclusive Economic Zone* by H G Spencer, R C Willan, B A Marshall and T J Murray – which is periodically updated at

www.molluscs.otago.ac.nz/index.html

Authors should also save the editor work by checking the spelling of these names very carefully. Following standard practise, in long lists of species the species names should NOT be listed in alphabetical order but in systematic sequence (with Family headings) as in the 'Checklist'. Bruce Marshall, our 'resident malacologist', is very willing to check identifications or species names for any members who would like his help. Please take advantage of this generous offer. The Editor is always happy to discuss proposed contributions with members.

***Checklist of the Recent Mollusca described from the New Zealand Exclusive Economic Zone*:**

This electronic checklist is a compilation of information that has already been published; it does not contain any original name changes or new records. Therefore, it can be regarded as a "tool of convenience" giving the latest names and where to find the publications in which any new changes will have appeared. New name changes are regularly given in a section entitled "Recent Changes to the Web Page" with a reference to the publication in which the change was made. The Mollusca Section library at the Museum of New Zealand Te Papa Tongarewa contains an unsurpassed collection of the world literature on Mollusca, and the original sources of any name changes can easily be consulted, by arrangement with Bruce Marshall, if needed. This list is linked to our website.

Wellington Shell Club Publications

Cookia is the journal of the Wellington Shell Club and is published annually, containing articles and smaller items of interest on shells, shell collecting, and molluscs as well as other related marine topics.

Cookia was first published in 1976; prior to this the Club published a *Circular*, then a *Bulletin*, as well as occassional *Study Notes* on various families of Mollusca.

PUBLICATIONS TO DATE

1956–1965 *Circular* 1 to 21

1967–1975 *Bulletin* 1 to 36

1976–1977 *Cookia* Volume 1, Nos 1, 2, 3

1977–1978 *Cookia* Volume 2, Nos 1, 2, 3

1979–1980 *Cookia* Volume 3, Nos 1, 2, 3

1980–1981 *Cookia* Volume 4, Nos 1, 2, 3

1982–1984 *Cookia* Volume 5, Nos 1, 2, 3, 4

1985–1992 *Cookia* Volume 6, Nos 1, 2, 3, 4

1993–1996 *Cookia* Volume 7, Nos 1, 2, 3, 4 [Index]

1997 *Cookia* Volume 8

1998 *Cookia* Volume 9

1999 *Cookia* Volume 10

2000 *Cookia* Volume 11

2001 *Cookia* Volume 12

2002 *Cookia* Volume 13

2003 *Cookia* Volume 14 [The Shell Lists]

2003 *Cookia* Volume 15

2004 *Cookia* Volume 16

2005 *Cookia* Volume 17

(*Cookia* Volume 7, No 4, is an index of all articles in the Club's publications to 1996)

BACK ISSUES

Back issues of *Cookia* are available at cost plus postage; individual articles, and copies of the Bulletins, Circulars and Study Notes can be ordered at 10c per page plus postage, from Jill Burnet, 84 Brougham Street, Mt Victoria, Wellington, New Zealand; or see our homepage at **users.actrix.co.nz/littlejn**

HOW WELL DO YOU KNOW THAT SHELL? ANSWERS

1 – Semicassis pyrum • 2 – Benhamina obliquata • 3 – Haliotis iris
4 – Calliostoma tigris • 5 – Cymatium parthenopium • 6 – Tonna cerevisina
7 – Mesopeplum covexum • 8 – Provocator mirabilis • 9 – Tugali elegans

A bit of lip – how well do you know the shell?

Identify the nine NZ shells below from the photographic portion shown. Answers are on page twenty four.